

## Refine Search

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717/\$\$\$ccls. AND hot.ti.	3

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L5





### Search History

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result set

DB=USPT; PLUR=NO; OP=OR

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<u>L3</u>	L1 and threshold.ti.	0	<u>L3</u>
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☐ 1. Document ID: US 6681387 B1

L5: Entry 1 of 3

File: USPT

Jan 20, 2004

US-PAT-NO: 6681387

DOCUMENT-IDENTIFIER: US 6681387 B1

TITLE: Method and apparatus for instruction execution hot spot detection and monitoring in a data processing unit

DATE-ISSUED: January 20, 2004

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hwu; Wen-mei William	Champaign	IL		
Merten; Matthew Carl	Champaign	IL		
Trick; Andrew Raymond	Champaign	IL		
George; Christopher Neith	Urbana	IL		
Gyllenhaal; John Christopher	Livermore	CA		

US-CL-CURRENT: 717/158; 711/1, 712/234, 714/38, 717/127, 717/131

## ABSTRACT:

Disclosed is a method and apparatus for detecting and monitoring program hot spots during execution that may be implemented in hardware. A hot spot detector tracks branch instructions which are retired. Frequently executed branch instruction addresses within a particular interval are designated as hot spot candidates. A hot spot detection counter is used to track non-hot spot branches and hot spot candidate branches. When hot spot candidate branches are frequently encountered compared to non-hot spot candidate branches, the hot spot detector may notify the operating system and hot spot candidate branch addresses may be supplied to a runtime optimizing compiler and a monitor table or a hot spot monitor. The hot spot monitor may disable the hot spot detector when a program is operating in known hot spots and may enable the hot spot detector if the program has strayed from known hot spots.

59 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 5

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw. De
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☐ 2. Document ID: US 6470492 B2

L5: Entry 2 of 3

File: USPT

Oct 22, 2002

US-PAT-NO: 6470492

DOCUMENT-IDENTIFIER: US 6470492 B2

TITLE: Low overhead speculative selection of hot traces in a caching dynamic translator

DATE-ISSUED: October 22, 2002

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bala; Vasanth	Sudbury	MA		
Duesterwald; Evelyn	Boston	MA		

US-CL-CURRENT: 717/128

## ABSTRACT:

A method and apparatus for selecting hot traces for translation and/or optimization is described in the context of a caching dynamic translator. The code cache stores hot traces. Profiling is done at locations that satisfy a start-of-trace condition, e.g., the targets of backward taken branches. A hot target of a backward taken branch is speculatively identified as the beginning of a hot trace, without the need to profile the blocks that make up the trace. The extent of the speculatively selected hot trace is determined by an end-of-trace condition, such as a backward taken branch or a number of interpreted or native instructions. The interpreter is augmented with a mode in which it emits native instructions that are cached. A trace is cached by identifying a hot start of a trace and then continuing interpretation while storing the emitted native instruction stream until an end-of-trace condition is met.

13 Claims, 3 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw D
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☒ 3. Document ID: US 6189141 B1

L5: Entry 3 of 3

File: USPT

Feb 13, 2001

US-PAT-NO: 6189141

DOCUMENT-IDENTIFIER: US 6189141 B1

TITLE: Control path evaluating trace designator with dynamically adjustable thresholds for activation of tracing for high (hot) activity and low (cold) activity of flow control

DATE-ISSUED: February 13, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Benitez; Manuel E.	Cupertino	CA		
Mattson, Jr.; James S.	Campbell	CA		
Buzbee; William B.	Half Moon Bay	CA		
Shah; Lacky V.	Sunnyvale	CA		

US-CL-CURRENT: 717/153; 717/156, 717/158

## ABSTRACT:

A computer-implemented system, method, and product are provided to designate and translate traces of original instructions of an executable file at run time based on dynamic evaluation of control flow through frequently executed traces of instructions. Such designation typically reduces unnecessary translations and optimizations, and thereby increases execution speed and reduces the usage of memory and other resources. The invention includes a hot trace identifier to identify frequently executed traces of instructions and a hot trace instrumenter to instrument such frequently executed traces so that control flow through them may be recorded. If the amount or rate of control flow through a frequently executed trace exceeds a threshold value, a hot trace selector is invoked to select a hot trace of original instructions including those of the frequently executed trace. The hot trace may be dynamically optimized. The system, method, and product also provide for the continuous recording of control flow through hot traces. If control flow has changed during execution, such that the amount or rate of control flow through a hot trace falls below a threshold value, the trace may be removed.

69 Claims, 15 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 13

Full	Title	Citation	Front	Review	Classification	Date	Reference	Drawings	Abstracts	Claims	KWIC	Draw. De
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Terms	Documents
717/\$\$.ccls. AND hot.ti.	3

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L3 AND flow	35

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Search:

L4

Refine Search

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*DB=USPT; PLUR=NO; OP=OR*

L4   L3 AND flow

35   L4

L3   L2 AND display

39   L3

L2   L1 and monitor

40   L2

(5720018 6473638 5903730 6059842 5953730 5761063 5740429 5982373  
 6041333 6128629 6476304 RE34559 5375199 6163740 5446838 5576946  
 6289299 5664190 6036345 6141699 6178460 5432932 5483468 5506955  
L1   5553235 5684945 5836529 5949976 6070190 6199199 6321263 6330008  
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 5980264 5987149 6003145 6112194 6256399 6314470 6324126 6324490  
 6333948 6466683).pn.

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